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(54) Treatment of contaminated waste plastics material

(57) Radioactive contaminated plastics material is treated by reducing it to uniform-sized debris and extruding it from a heated extruder into a sealed container in monolithic block form or as an in-fill matrix for other contaminated waste articles to create a substantially void-free sealed mass for disposal. Density adjusting fillers may be included. Extrusion may alternatively take place into a clean sealable plastics tube.

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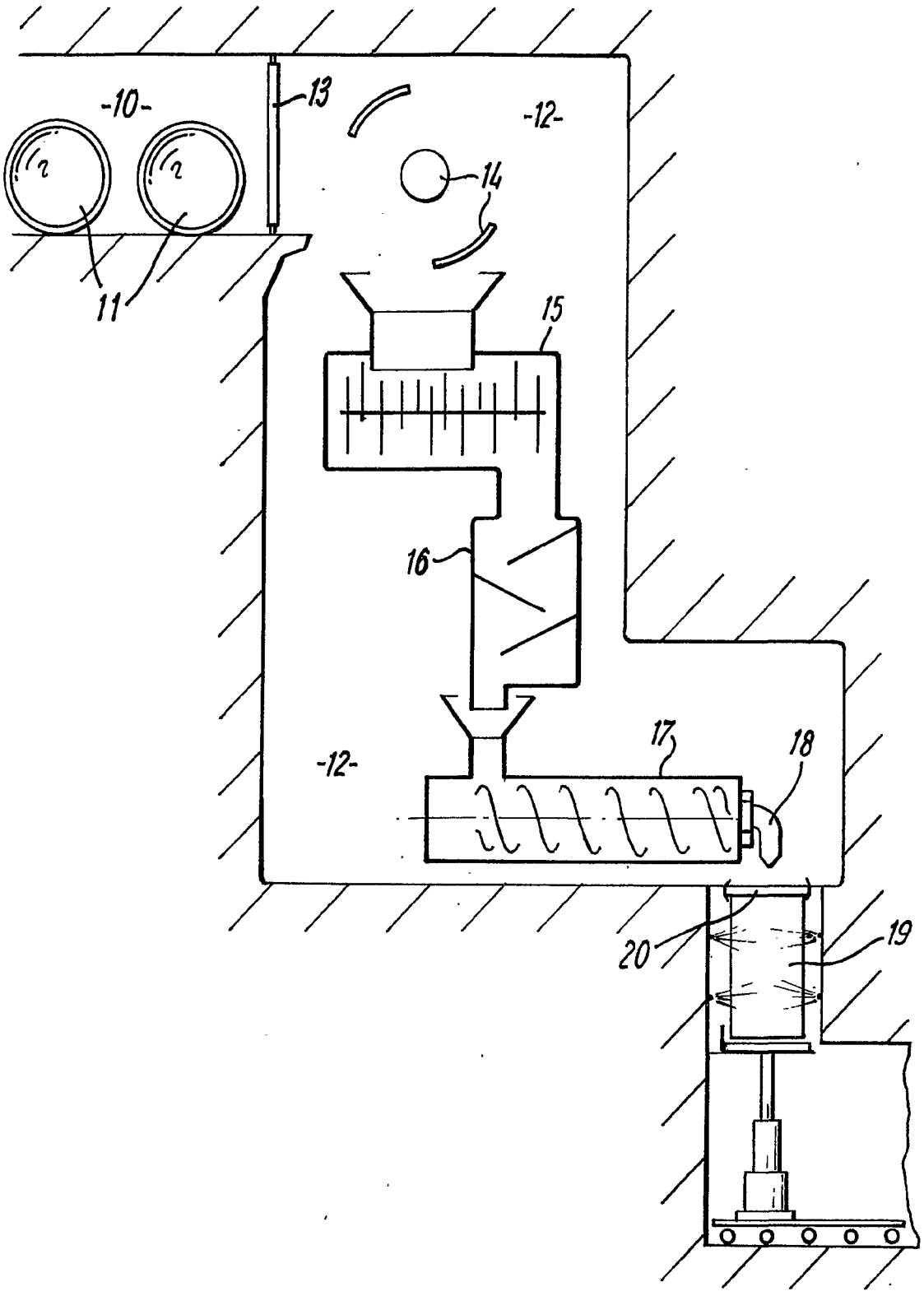
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SPECIFICATION

Treatment of contaminated waste plastics material

This invention relates to the treatment of waste plastics material and is primarily concerned with the treatment of contaminated plastics material.

Considerable quantities of plastic items (sheet, gloves, bottles, shoes etc.) are used in the day to day operational and maintenance duties on sites dealing with radioactivity (power stations, fuel fabricators, research establishments, naval stations etc.). This plastic becomes contaminated by debris emitting alpha, beta and gamma radiation and has to be disposed of at the end of its useful life. This is currently done by packing the plastic in whole or shredded form into sealed containers which are then transported and stored at approved storage sites.

The present packaging methods are wasteful in volume terms leading to absorption of valuable approved storage sites and excessive transport and storage costs. Further, present packaging methods give no consideration to locating radioactive contamination in preferred regions of the packaging nor to restraining migration of radioactive contamination.

The present invention gives consideration to the above stated aspects of present packaging methods with the object of effecting improvement.

According to the present invention waste plastics material is treated to increase its packaging density by passing it through an extruder to form it into a common matrix or monolithic block.

Preferably the material is pretreated to reduce it to substantially uniform sized debris. The debris may be further reduced by heat shrinkage. Fillers may be added to provide density adjustment (e.g. to 1.2 grams per c.c.) for sea disposal.

The extruded material may be used as an in-fill for voidage in or between contaminated solid articles due for disposal.

Where only alpha-emitting contamination is involved, extruded material may go directly into a sealable clean plastics tube or similar container so that it can be easily handled with safety with the contamination located in a preferred region.

The invention will now be described further with reference to the accompanying drawing which is a pictorial flow diagram.

Contaminated waste plastics material is received at station 10 securely contained in either plastics bags or sealed metal drums 11. These are posted into a reception chamber 12 through a door 13 where they are received by an opening and tipping machine 14 which empties the contents into a shredder and granulator 15 which renders the waste plastics material into uniform sized debris.

From the granulator 15 the debris falls through a heater 16 to pre-shrink it. The preheated debris then passes to a crammer feeder and heated extruder 17. The debris then extrudes through a nozzle 18 into a cooled drum 19 which is eventually sealed with a lid 20 which is a part of a known type to splittable double lid arrangement to ensure that contamination does not arise on the external lid surface of the drum 19 when sealed.

The invention thereby provides a process by which radioactively contaminated plastic items can be reduced to a common solid form. All types of plastic (i.e. P.V.C., polythene, perspex, etc.) formed by the various workshop practices (i.e. moulding, casting, rolling, drawing, extrusion etc.) may be treated and reduced to a common matrix. A benefit of the proposed process is that radioactive particles are entombed in the resulting monolithic plastic block which prevents their migration.

Nearly 0% voidage results with all radioactive particles entombed in a monolithic block.

The contaminated extruded waste may be used as a volume filler in containers filled with radioactivity contaminated solid waste (i.e. steel, aluminium, "Nagnox", ion exchange resins, filter elements et.). This has dual advantage of forming the individual waste items into a single monolithic block and avoids the use of clean (non-radioactive) cements and/or plastics for this purpose which are both wasteful in terms of expense and volume occupied by clean (non-radioactive) material.

Claims

1. The treatment of waste plastics material by passing it through an extruder to form it into a common matrix or monolithic block in a sealed container.

2. The treatment of claim 1 characterised in that the material is pretreated to reduce it to substantially uniform sized debris.

3. The treatment of claim 2 including the step of volume reduction of the debris by heat shrinkage.

4. The treatment according to any preceding claim including the addition of density adjusting fillers.

5. The treatment according to any preceding claim followed by the use of the treated material as an in-fill in or between solid articles for disposal.

6. The treatment according to any one of claims 1 to 4 in which the waste plastics material has alpha-emitting contamination and is extruded directly into a sealable clean plastics container.

7. The treatment of waste plastics material substantially as hereinbefore described with reference to the drawing.

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